Radical C^2 Doctrine and CP Design

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The instruments of battle are valuable only if one knows how to use them.
—Ardant DuPicq

A new CP design model is clearly required to realize significant increases in performance while improving efficiency and survivability. Both examples display that failing to perform a job correctly can result in catastrophic consequences. Force XXI CP design requires new thought paradigms. Designers must adopt a radical "out-of-the-box" approach to negate the experiential mind-set of "that's the way we have always done it" that influences current efforts.

THE DIVISION COMMANDER's command and control (C2) vehicle moves swiftly across the division's battlespace, just behind the digitized division's right flank brigade. He patches his cavalry squadron commander's optical scanner and the unmanned aerial vehicle video into his processing unit to monitor the division's flank. Moments later, his division's combat vehicles roll past the burned-out hulks of enemy armored vehicles scanning for signs of movement. Suddenly, the flank brigades' vehicles swerve hard left to avoid enemy artillery. They received an alert warning and flash command from the division commander through their on-board computer decision support processors. All players in this division know precisely where every battlefield element is. No more guessing, no lack of information, no mistaken identity; just positive control. Welcome to the world of the commander of a Force XXI unit.

Will the design and processes being developed for the future command post (CP) support a scenario such as this one? If there is any doubt at all that it will be able to, the U.S. Army must reexamine its CP design processes and make some significant course adjustments. Ultimately, the CP's primary role is to help the commander maintain situational awareness. Too much information can be more detrimental to effective battlefield decisionmaking than too little, as it consumes valuable time to analyze data and convert it to timely, meaningful situational awareness during the battle. Emerging technology and function-based processes are the cornerstones for developing future CPs. The Army still needs the human interface, but quantum improvements in digitization, space-based technology, airborne platforms, and rapidly processed data allow commanders to decide, detect, and deliver much faster than ever before on the battlefield.

In the information age, compressed time dramatically affects the commander's ability to assess the situation, make a decision, and then act. Radical change requires moving away from designing CPs around the military decisionmaking process. The U.S. Army Training and Doctrine Command (TRADOC) action officers and senior leaders will chair meetings and conferences to determine new CP designs, only to be met with defeat or bureaucratic inaction. It would seem that these meetings are uniformly unproductive because their premise is flawed. These conferences normally invite each branch and functional proponent to contribute to the CP design by submitting its personnel and equipment requirements. Proponent representatives' perceptions of what functions the new CP would require and emerging doctrine would guide their input into the design process. Proponents lobby hard to convince leaders that without their presence and support in the tactical operations center (TOC) soldiers will die. Collecting each proponent's requirements into one unit always produces the same outcome. The CP does not become smaller; it grows exponentially with the number of proponents. Look at the size and complexity of current CPs to see how successful they have been at increasing CPs' size and complexity.

Today's Army is conceiving, shaping, testing, and fielding an Army that must be prepared to meet the challenges of the new millennium at a furious pace. Technological advances continue to shape the way the Army will fight. The pace of operations and the volume of information are now greater than ever before. A key factor in the success of this change is the unit CP. Transitioning from current C2 operating procedures and processes using radical, revolutionary thought is the focus of this article. To function in an environment like the one described, a sea change in thought and actions on CP roles and functions is required to design and field future CPs.

CP Design

Imagine the bridge of the *Starship Enterprise* as the ideal 21st-century CP. It has all the basic requirements: a small, integrated staff; instant access to information from all supporting elements; and large-screen situational awareness. It would not be a great stretch to apply the starship model to Army C2 requirements. In Lewis Carroll's book, *Alice in Wonderland*, the Mad Hatter counsels Alice: "If you don't know where you are going, any road will get you there." This sentiment might aptly describe current CP design efforts and results.

One would expect that CP design and reorganization efforts would accomplish more than moving battlefield operating system (BOS) cells from one location to another without increasing efficiency. An analogy of current CP development methods is one in which Boeing develops the 747 by contracting with United Airlines to produce an improved 737 while it is still in service. On the surface, the 747/737 comparison seems an extreme analogy, but is it? The tasks of designing a new aircraft or designing a new CP with digitized C2 capabilities share similar levels of design complexity and system integration. A new CP design model is clearly required to realize significant increases in performance while improving efficiency and survivability. Both examples display that failing to perform a job correctly can result in catastrophic consequences. Force XXI CP design requires new thought paradigms. Designers must adopt a radical "out-of-the-box" approach to negate the experiential mind-set of "that's the way we have always done it" that influences current efforts.

Proposed Developmental Paradigms

Changes in the way we think and approach C2 require several different but interrelated elements. Evolutionary change requires a forward-looking, anticipatory approach to horizontal and vertical integration and synchronization of doctrine, training, leader development, organization, materiel, and soldier support initiatives from a total system perspective. Each CP design is rooted in a set of baseline, but immutable, functions of battle command processes and procedures at each echelon for each proponent. Following are some development paradigms.

The perils of semantics. The first step toward thinking out of the box is to break away from current doctrine's terminology and semantics. Uncontrolled, diversity in perceptions and experiences is one's worst enemy in designing new CPs. However, with control and focus, diversity is an inherent strength. The procedures and processes individuals have experienced in previous CPs limit their ability to think outside the box. Therefore, when discussing CP operations, 10 experienced commanders and staff officers may have 10 different visions of how to apply the concept they just discussed. Subsequently, papers, e-mails, and workshops that follow are ineffective due, in part, to the participants' different perspectives and experiences. These efforts result in merely rearranging BOS cells and elements within current organizational structures without substantially changing end-state design, efficiency, or survivability.

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To limit the effect of experiential perceptions when developing new concepts, change the C2 terminology during the conceptual stage. For example, address future CPs as control and direction centers. What they are called is less important than the mind-set present while conceptualizing a new design. "Business as usual" limits design options by assuming predetermined mind-sets. The result is similar to rearranging the deck chairs on the Titanic, whereby there are no substantive direction changes. It is essential that semantics be changed to limit current commanders' and staffs' experiential perceptions so they can think outside the box and achieve a fresh, innovative perspective of new C2 doctrine and facilities design.

Question C2 doctrinal and operational norms. The second essential element of thinking out of the box is to question the way C2 is currently conducted. For example, do units still require a tactical (TAC) CP? Maybe not! Research shows that there is no definitive documentation directing the establishment of a TAC CP as an element of a C2 structure. Yet, every maneuver headquarters above battalion has some form of TAC CP. The TAC CP was probably originally the idea of a commander who displaced one vehicle forward from his main CP to support radio communications with his forward units. He could then work from the vehicle without traveling back to the main CP. Other commanders likely used this idea because it was successful and solved a common problem.

Radical change requires moving away from designing CPs around the military decisionmaking process. TRADOC action officers and senior leaders will chair meetings and conferences to determine new CP designs, only to be met with defeat or bureaucratic inaction. It would seem that these meetings are uniformly unproductive because their premise is flawed.

Eventually, using a TAC CP became the norm and found its way into doctrine. What may have started out as one M577 or other CP vehicle evolved into today's TAC CPs, with eight, 10, or more supporting vehicles. In reality, the TAC CP simply evolved over time. This evolutionary process resulted in its current position as an essential element of CP operations. Once in doctrine, the TAC CP became a documented and accepted requirement for successfully applying C2 doctrine. Today's TAC CP growth in size, complexity, and importance borders on being dysfunctional to effective C2 operations. Out-of-the-box thinking requires serious questioning of both doctrinal and operational norms.

This article does not imply that a commander no longer needs to go forward. A commander must go forward to be a successful leader during battle, but a commander may no longer have to go forward to control tactical operations. If the limitations of the range of the radio communications structure created the original requirement for a TAC CP, then it evolved for all the right reasons. Today, however, advances in digitization and communications would negate this requirement. Major General P. Wood, commander of the 4th Armored Division during World War II, is an example of a commander who used successful battlefield C2 techniques. Wood commanded his division in combat well forward and issued orders from the hood of his jeep.

Today's battlefield commander can see and control his forces more effectively from his main CP, which means the TAC CP is no longer a viable C2 mechanism. Other C2 functions also require scrutiny: staff structure at all echelons; supporting elements such as the fire support element (FSE), engineer, and air defense artillery (ADA) cells; the rear CP; and a planning cell. Each of these norms requires review and revision.

Design to proven baseline parameters. Managing the critical requirements of CP design requires a set of proven parameters with which to measure effectiveness and efficiency. These parameters support the designing and testing phases of CP development. More important, they offer easy-to-understand rules that will filter unneeded functions or processes that migrate into the CP structure. Commanders need baseline design parameters to follow when developing the CP's conceptual and physical capabilities. Each parameter will support change, but it is within their collective synergy that real change will begin. The following suggest some developmental parameters for CPs:

Form follows function. Real design change must start with a change or revision of proven or perceived C2 functions. Renowned architect Frank Lloyd Wright used the concept of "form follows function" in all of his building designs. Using this concept, Wright would identify and study the functions to be performed in the building and then design the structure to support those functions. Today, it seems that there is a "ready, aim, fire" approach to CP design—determining the number of vehicles needed to support the CP and its physical layout and then determining its functions. CP design must be function based rather than based on the perceptions of novice designers and developers. A no-kidding list of critical wartime functions is required to allocate space and equipment to support that function.

Unit is committed to combat. The premise of this parameter is that the unit is actively committed to a combat operation in which soldiers are in harm's way. Those who have been in combat know that such a situation warrants establishing priorities quickly. However, one day, the Army will encounter a tougher foe than Saddam Hussein's Republican Guard or unorganized riffraff in the Third World. When that day arrives, there will not be anything virtual about the reality. CPs designed around deploy-

Sergeant Barry P. Platt, US Army

The 4th Squadron, 7th Cavalry TOC in Iraq, 2 March 1991.

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ment or planning tasks do not reflect the exigencies of combat. The reality of combat operations must be the standard from which each design is developed and measured. Author Guy Sager's book, *The Forgotten Soldier*, graphically describes the conditions to be experienced in combat and under which the CP must function.

Establish baseline information requirements. This design parameter implies that there are a limited number of critical information requirements necessary for a unit to conduct combat operations. For example, the commander of a heavy brigade must be aware of certain fundamental information requirements regardless of the mission or area of operations. At a minimum, the commander requires the location of his subordinate elements one level down, the status of class III, the status of class V, the status of his fighting vehicles, personnel status, and enemy units' locations. These five baseline information requirements are critical to successful brigade combat operations. A light brigade commander's baseline functions would necessarily be somewhat different in that he would be less concerned with the status of class III. They apply whether the unit is fighting conventionally in Iraq or conducting peace enforcement operations in the Balkans.

The S3 provides unit locations, the S4 provides the status of classes III and IV, the S1 provides personnel status, and the S2 provides enemy units' locations. During combat, all other information is noise to the commander that inhibits his ability to maintain situational awareness. Any other information requirements are situational requirements that can be added and deleted, according to the mission. This example applies to all command and staff functions in each proponent of the C2 architecture. Determining the baseline information requirements of each CP for each echelon and proponent will set the parameters for identifying mandatory equipment and personnel. When information is filtered this way, excess, nonessential information is removed, and the commander and staff can wrestle with the factors that are critical to winning on the battlefield.

Reduce physical size. To survive, the future CP must be small and agile. It should contain only those personnel and supporting vehicles necessary to support combat functions. Being small increases the CP's survivability through increased mobility. A small physical footprint increases the enemy's difficulty in distinguishing between a division CP and a lower-priority CP. A division-level main CP can conceivably consist of four to six vehicles. Digital capabilities allow the CP to electronically collocate and conduct operations on the move without degrading efficiency. By reducing its physical size, the CP leverages the advantages of increased mobility, increased survivability, and mobile operations. Developers should analyze the efficiency of roles and functions of major subordinate command support or slice elements in current FSE or ADA facilities. These support elements are a throwback to World War II and the Cold War when communications were less efficient and commanders required a BOS subject matter expert close by for employment advice.

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The CP's physical size and complexity contribute to the CP's electronic footprint. The 21st-century CP will be vulnerable to targeting by enemy electronic and information operations capabilities. The January 2000 version of the new interim brigade combat team brigade main TOC alone identifies more than 75 separate vehicles. Assume that each vehicle has one or more radios or electronic devices that are vulnerable to electronic targeting. CP designs must limit the electronic emissions of dig-ital and analog equipment. Electronic collocation will significantly reduce battlefield electronic footprints and thus increase survivability. Reducing CP size requires determining the physical location of personnel supporting C2 architectures. G1 and G4 functions are easily performed from the rear, so why do those staff members need to be forward?

Leverage digitization. In the midst of creating tactical internets, client servers, local area networks, applique, and Army Battle Command System initiatives, it is difficult to know how to dominate a battlefield using technologically provided knowledge. Digital equipment can provide real-time, merged information for the commander in a clear, uncluttered common operating picture (COP). An absence of current digital capability is no reason to discard an idea. Establishing such a requirement will hasten that equipment's development. Digital equipment pushes baseline data to the commander at the appropriate echelon, but at the same time, it allows the commander to pull additional data about subordinate, adjacent, and higher units, as required. Combined with other parameters, digitization improves overall operational efficiency. Digitization, if developed from a functional basis, can give the commander a clearer, quicker, more complete picture of a tactical situation through a properly designed COP. The reachback concept is an example of using digitization to reduce the number of sustainment organizations in emerging transformation unit designs. Reachback-capable units rely on the push-pull concept of logistics support from a logistics base in theater or within the continental United States. This is also a large portion of transforming the intelligence concept.

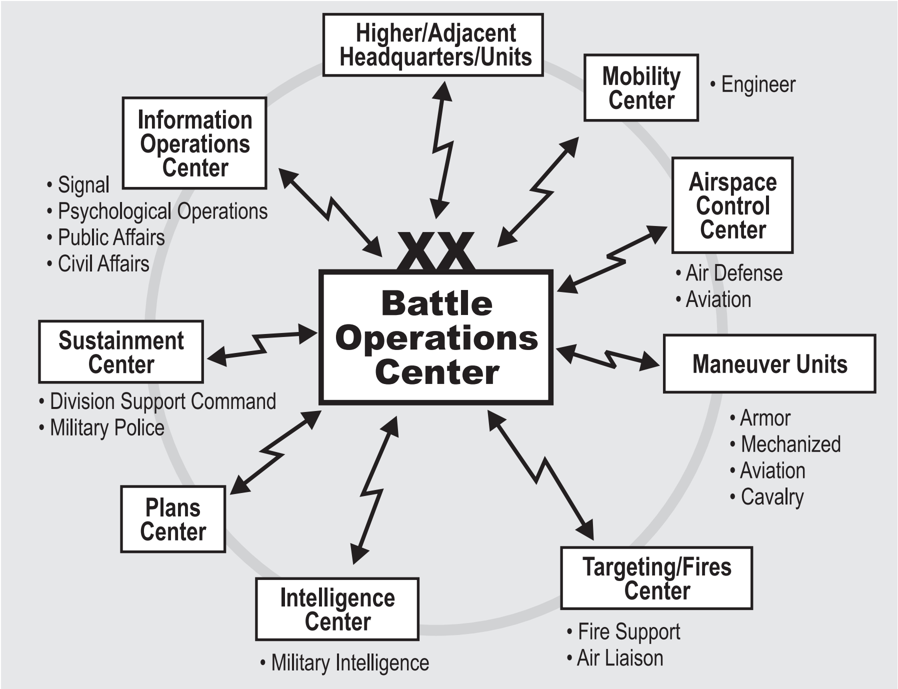

Figure 1. Battle Operations Center (BOC) Integration Concept

A Radical Design Concept

Using the design paradigm and parameters described earlier, future CP designs are more effective than current designs. The C2 functions of personnel, logistics, intelligence, and operations will provide effective control on the battlefield. These staff elements, residing in combat CPs, have served the Army well in all previous wars. There is no reason to doubt that whatever their genesis, these core functions are on target. Each of these battle staff elements includes a baseline set of information requirements that support the commander's situational awareness and decisionmaking ability.

Why not begin the design process by eliminating all staff elements from a CP except operations, personnel, intelligence, and logistics? We use these functions to identify the baseline commander's critical information requirements (CCIR) and then develop the CP concept around them. To lessen the impact of semantics on our thinking, the new CP is a battle operations center (BOC). This way, no one visualizes previous CPs, and minds are clear of experiential perceptions.

Figure 1 represents a conceptual integrated division-level BOC. This design uses electronic collocation to eliminate the main, rear, and TAC CPs and any accompanying duplication of effort. All supporting functions—engineer, aviation, FSE, and ADA—are returned to their proponent CPs. For example, the division engineer now supports the BOC with critical engineer information from the mobility center. With digitization, the BOC commander or his command group can get the same data directly from the engineer brigade quicker and more efficiently than the division engineer cell could. Removing the division engineer cell removes another roadblock to effective, efficient communications. The mobility center would be the center of engineer C2 functions anchored by the senior supporting engineer unit.

Moving proponent and branch functions back to their parent CPs has several positive effects. First, it reduces the number of personnel and equipment at the division BOC, thus reducing its size and increasing mobility and survivability. Second, still using the engineer example, it reduces the number of personnel on the engineer brigade's modified table of organization and equipment as organic staff initially generated the information requirements. There is no longer a requirement for a division engineer cell. This same analogy pertains to all supporting proponent functions and has the same positive cumulative effects. This does not mean that, given a special mission or situation, an engineer or other element could not plug into the division BOC. The plug-in would only be temporary, and once the situation passed, the element would unplug and return to its primary C2 center.

In the end, every aspect of the C2 system is focused on enhancing the commander's ability to see the terrain at every level; to see the enemy; to see himself; to employ combat power with precision; and to visualize how to employ his forces against the enemy at the time and place he chooses. In the final analysis, all combat actions, requirements, and initiatives apply to one or more processes or functions a unit CP requires somewhere on the battlefield.

In this concept, each piece of mission-specific information travels manually or digitally to the operations, intelligence, logistics, and/or personnel functions in the BOC. The staff manning these functions coordinates, integrates, and synchronizes current and future operations requirements. All intelligence information requirements enter the BOC through the G2 or intelligence cell communications devices. The G2 filters the information to only what information the commander thinks applies to current or future tactical decisions by updating the commander's COP. These staff elements filter information to reduce the information quantity and complexity that the commander receives.

At a minimum, the commander requires the location of his subordinate elements one level down, the status of class III, the status of class V, the status of his fighting vehicles, personnel status, and enemy units' locations. . . . The S3 provides unit locations, the S4 provides the status of classes III and IV, the S1 provides personnel status, and the S2 provides enemy units' locations. During combat, all other information is noise.

Pushing up baseline information requirements to the BOC reduces clutter and frees the commander and his staff to analyze critical information. The BOS functions that formerly collocated with the maneuver or command BOC return to being function-specific BOCs in their own right. The Airspace Control Center, for example, can consist of both the aviation brigade and ADA battalion BOCs because deconflicting airspace is critical. These elements do not have to be collocated at the main supported BOC to communicate with it. Critical baseline information requirements must be determined for each center to establish standing operating procedures (SOPs) and reporting protocols.

This design also allows increased redundancy and data duplication so that servers at other centers store all information, allowing a unit to quickly assume the functions of a destroyed cell. It improves survivability

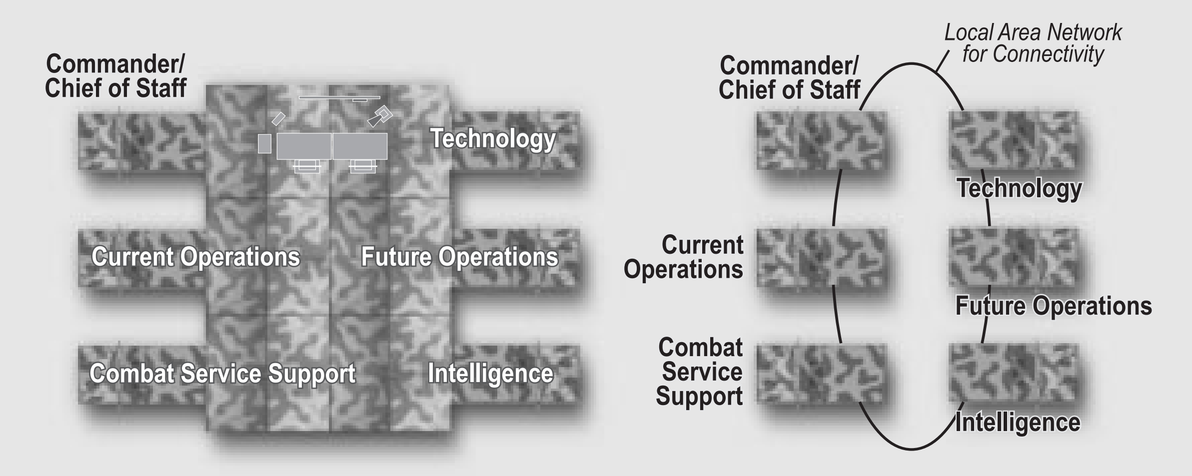

Figure 2. BOC Configuration With and Without Shelters

by dispersing CPs with similar electronic signatures. Overall, this design will reduce the size and complexity of all CPs. The centers can support operations from home station, on the ground in theater, or from ships. The electronic collocation capability provides the flexibility to respond to unforeseen situations.

The nerve center of this concept is the division BOC. Operationally, the BOC is a redesigned division main CP. The BOC receives all CCIR that are generated on the battlefield. Figure 2 represents a conceptual design of a division BOC. This design can also be applied to corps, brigades, or battalions. Without the proponent elements and their accompanying support, the BOC can reduce its size, potentially operating more efficiently with increased survivability. The BOC employs a modular concept with an easy plug-in and plug-out capability for organic and task-organized units to support situational requirements.

All BOC equipment is permanently mounted in high-mobility, multipurpose wheeled vehicles or designated CP vehicles to enhance deployability, sustainability, and survivability. In a committed environment, operators and battle captains function from within the vehicle shelter. There is no requirement to erect external shelters during tactical operations. CCIR feed directly into each element's COP. The vehicle's driver is prepared to move out of the CP location to a rally point at a moment's notice if the BOC is attacked. Time is not a factor because there is no requirement to load or pack equipment before movement. Tents or other shelters are left in place because, realistically, in combat, they are not important compared to the survival of the unit's C2 capability. CP personnel operate communications equipment remotely from the vehicle when uncommitted.

Establish a C2 University

Our goal is to speed up the requirements determination process while at the same time improving its products. We must find smarter ways to do business, streamline our management processes. . .and use what we have more effectively in order to become more effective.

—General Dennis J. Reimer
Chief of Staff, U.S. Army

Implementing this concept will require a facility in which testing each concept ensures complete integration across the force. Equally important is developing training packages to support the new concepts. The U.S. Army Combined Arms Center (CAC) is postured to take the lead in developing and coordinating an innovative C2 development strategy that supports warfighter C2 requirements as well as future force CP developments. CAC should establish a C2 university to support Armywide C2 research, design, and training. The university could become the Nation's preeminent C2 training facility and showcase learning, training, and creative CP design endeavors at all Army echelons as well as joint services and combined operations.

Embedded in the C2 university structure is a CP skunkworks—a national laboratory for integrating innovative C2 concepts, operating procedures, and training packages. In a skunkworks environment, design engineers are free to pursue concepts without pressure from special interest groups. The skunkworks would serve as the CP operations clearing house in which CAC would be responsible for designing and testing all battalion through echelon above corps CPs and approving all new CP equipment. This responsibility would include developing and testing CP processes and SOPs. Each CP undergoes rigorous classified and unclassified operational testing before its design goes into full-scale production for fielding. CAC has the resident civilian and military work force to battle roster staff assignments with civilians, permanent-party staff, and Command and General Staff College instructors and students to establish functional consistency during testing. Testing new equipment at the skunkworks ensures that it fully supports emerging processes and is compatible with systems currently being used.

Equally important, however, is the ability to support the developing CP training programs. Using the Boeing 747 analogy, when an airline buys a new airplane, Boeing provides qualification training for the pilots and maintenance personnel, and a complete support and training package to the organization buying the aircraft. The Army should follow this model when fielding new CPs. New CP equipment would be sent to Fort Leavenworth, Kansas, directly from the factory production line. At Fort Leavenworth, qualified skunkworks personnel would thoroughly inspect the new CP equipment to ensure that all systems operate according to specifications. The unit CP personnel would then receive their new equipment and participate in a rigorous 2-week Battle Command Training Program warfighter-type training exercise. Successful completion of this training would result in a CAC competency certificate. Once certified, the unit would sign for its equipment and transport it back to home station.

Army aviation used a variation of this concept to field AH-64s to aviation battalions stationed at Fort Hood, Texas. The C2 university could provide initial and refresher training in CP procedures to new commanders and staffs. Each unit would leave Fort Leavenworth fully trained on proven CP processes and procedures on fielded CP equipment. Through this concept, CAC would establish and maintain a consistency of C2 operations throughout the Army and effectively raise the bar for CP operations.

Each TRADOC school and center can establish the same model for its proponent CPs. For example, Fort Rucker, Alabama, would establish a skunkworks for all aviation CPs. Each site could conduct exercises through the World Wide Web. With CPs electronically collocated, real-world testing of complete systems can occur through standardized processes, developing each CP into an integrated whole. CAC would oversee all proponent school and center certification requirements. The Army can establish links among all proponent battle labs to develop and standardize CPs for like forces. The Armor Center would manage heavy forces, the Infantry Center would manage light forces, Fort Rucker would manage aviation, and so on.

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By identifying and harnessing promising technology, we can pass critical, time-sensitive information to the Warfighter TOC to assist battle command. Battle command is the cornerstone BOS and is critical to coordinating, synchronizing, and integrating available assets on a fast-paced battlefield. The past is truly the prologue to the future in increasing CP efficiency and effectiveness on the 21st-century battlefield.

Imaginations are the only limitations in the CP arena. The ideas presented in this article could prompt CAC to take the lead in designing new CPs. Baseline design parameters are the overarching factor for new CP design and development processes. A C2 university could provide a controlled test-bed for managing change and a methodology for analyzing Force XXI C2 issues and developing integrated force-level solutions. A skunkworks development and experimentation facility concept could give the Army an institutionalized end-to-end functional design and training capability. The concept could enable the Army to develop and export a total package of proven and integrated system of systems C2 tactics, techniques, and procedures and CP designs within a controlled, developmental environment. It could allow the Army to identify any C2 operational problem areas, both known and unknown, by applying a process reengineering methodology.

The CP is the critical component for applying innovation, and as such, it is simultaneously the area of greatest potential payoff and potential vulnerability. CP operations can ensure success when conducted well or result in failure if conducted poorly. ***MR***

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